

CLAIMS

1. A method of vaccinating a mammal to a selected antigen, the method comprising administering to a mammal a vaccine composition comprising a CD40 ligand-enhanced cell, wherein said CD40 ligand-enhanced cell comprises said selected antigen and is admixed with an engineered ligand for CD40.

2. A method of vaccinating a mammal to a selected antigen, the method comprising administering to a mammal a vaccine composition comprising a CD40 ligand-enhanced cell.

3. The method of claim 1 or claim 2 wherein said vaccine composition further comprises an opsonin-enhanced cell.

4. The method of claim 3 wherein said opsonin of said opsonin-enhanced cell is selected from the group consisting of mannose binding protein or the alpha' chain of C3b.

5. The method of claim 1 or claim 2 wherein said vaccine composition further comprises a cytokine.

6. The method of claim 5 wherein said vaccine composition further comprises a cell which expresses said cytokine.

7. The method of claim 5 wherein a recombinant nucleic acid molecule encoding said cytokine is artificially introduced into said cell and wherein said cell expresses said cytokine from said nucleic acid.

8. The method of claim 5 wherein said cytokine consists of a ligand for one of the following receptors: the IL-2 receptor, the IL-4 receptor, the IL-6 receptor, the IL-10 receptor, the IL-12 receptor, the TNF- α receptor, the IFN- γ receptor, a chemokine receptor or the GM-CSF receptor.

9. The method of claim 5 wherein said cytokine is an engineered cytokine.

10. The method of claim 9 wherein said engineered cytokine comprises a lipid.

11. The method of claim 1 or 2 wherein the ligand for CD40 of said CD40 ligand-enhanced cell
5 comprises a lipid.

12. The method of claim 11 wherein said ligand for CD40 comprises a GPI moiety.

13. The method of claim 11 wherein said ligand for CD40 comprises a fatty acid.

14. The method of claim 13 wherein said fatty acid consists of palmitate.

15. A method of vaccinating a mammal to a selected antigen, the method comprising
contacting an APC in vitro with a CD40 ligand-enhanced cell comprising a selected antigen,
15 for a time sufficient to permit internalization of said selected antigen by said APC, and
administering a vaccine composition comprising said contacted APC to a mammal.

16. A method of vaccinating a mammal to a selected antigen, the method comprising
contacting an APC in vitro with a CD40 ligand-enhanced, opsonin-enhanced cell comprising
20 a selected antigen, for a time sufficient to permit internalization of said selected antigen by said
APC, and
administering a vaccine composition comprising said contacted APC to a mammal.

Sub C.1. 17. The method of claim 1, 15 or 16 wherein said ligand for CD40 of said CD40 ligand-
25 enhanced cell comprises an exogenous engineered ligand for CD40.

18. The method of claim 1, 15 or 16 wherein said ligand for CD40 comprises a lipid.

19. The method of claim 1 wherein the ligand for CD40 of said CD40 ligand-enhanced cell
30 comprises at least 30 contiguous amino acid residues of a CD154 molecule.

20. The method of claim 19, wherein said CD154 molecule is human CD154.

21. The method of claim 1 wherein the ligand for CD40 of said CD40 ligand-enhanced cell comprises the idiotypic portion of an antibody which binds a CD40 molecule.

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22. The method of claim 21, wherein said CD40 molecule is human CD40.

Sub C2
23. The method of claim 1, 15 or 16 wherein said CD40 ligand-enhanced cell is a pathogenic cell.

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24. The method of claim 23 wherein said pathogenic cell is a malignant tumor cell.

25. The method of claim 23 wherein said pathogenic cell is drawn from the group consisting of : a bacterium, a virus, a fungus, a cell of a parasite.

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26. The method of claim 23, wherein said vaccine composition further comprises an opsonin-enhanced pathogenic cell.

27. A method of vaccinating a mammal to a selected antigen, the method comprising administering to a mammal a vaccine composition comprising an opsonin-enhanced pathogenic cell and a CD40 ligand-enhanced pathogenic cell, wherein said opsonin of said opsonin-enhanced cell is selected from the group consisting of mannose binding protein or the alpha' chain of C3b.

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Sub C3
28. The method of claim 1, 15, 16 or 27 wherein said CD40 ligand-enhanced cell is substantially unable to divide in vitro.

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29. The method of claims 1, 15, 16 or 27 wherein said vaccine composition is attenuated.

30. A composition comprising a CD40 ligand-enhanced pathogenic cell.

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31. The composition of claim 30 further comprising an engineered ligand for CD40.

32. The composition of claim 31 wherein said engineered ligand for CD40 comprises a lipid.

33. The composition of claim 31 wherein said engineered ligand for CD40 further comprises a
5 glycosylphosphatidylinositol moiety.

34. The composition of claim 32 wherein said lipid comprises a fatty acid.

35. The composition of claim 34 wherein said fatty acid is palmitate.

10 36. The composition of claim 30 or claim 31 wherein said ligand for CD40 comprises at least 30
contiguous amino acid residues of a CD154 molecule.

37. The composition of claim 36 wherein said CD154 molecule is human CD154.

15 38. A composition comprising a CD40 ligand-enhanced cell and a cytokine.

39. The composition of claim 38 wherein said cytokine is a ligand for one of the following
receptors: the IL-2 receptor, the IL-4 receptor, the IL-6 receptor, the IL-10 receptor, the IL-12
20 receptor, the TNF- α receptor, the IFN- γ receptor, a chemokine receptor, or the GM-CSF receptor.

40. The composition of claim 38 wherein said cytokine is an engineered cytokine.

41. The composition of claim 40 wherein said engineered cytokine comprises a lipid.

25 42. The composition of claim 38 wherein a recombinant nucleic acid encoding said cytokine is
artificially introduced into said CD40 ligand-enhanced cell and said CD40 ligand-enhanced
cell expresses said cytokine.

30 43. The composition of claim 30 or 38 wherein said CD40 ligand-enhanced cell is a malignant
tumor cell.

44. The composition of claim 30 or 38 wherein said CD40 ligand-enhanced cell is selected from the group consisting of: a bacterium, a fungus, a virus, a cell of a parasite.

45. A composition comprising a host cell comprising a CD40 ligand-enhanced cell into which a recombinant nucleic acid encoding an antigen has been artificially introduced and;
wherein said host cell expresses said antigen.

46. The composition of claim 45 wherein said host cell is a nucleated eukaryotic cell or a prokaryotic cell.

47. The composition of claim 46, wherein said host cell is a fibroblast or a keratinocyte.

48. The composition of claim 30, 38 or 45, further comprising an opsonin-enhanced cell.

49. The composition of claim 48, wherein the opsonin of said opsonin-enhanced cell is an engineered opsonin.

50. The composition of claim 49, wherein said engineered opsonin comprises a lipid.

51. The composition of claim 50, wherein said engineered opsonin further comprises a glycosylphosphatidylinositol moiety.

52. The composition of claim 50, wherein said lipid is a fatty acid.

53. The composition of claim 52, wherein said fatty acid is palmitate.

54. A composition comprising a CD40 ligand-enhanced cell, wherein said cell is substantially unable to divide in vitro.

55. The composition of claim 54, further comprising an opsonin-enhanced cell which is substantially unable to divide in vitro.

56. The composition of claim 30, 38, 45 or 54, further comprising a physiologically compatible buffer.

57. A composition comprising CD40 ligand-enhanced cells and a pharmaceutically acceptable carrier.

58. The composition of claim 57 further comprising opsonin-enhanced cells.

59. The composition of either of claims 57 or 58 further comprising a cytokine.

60. An engineered ligand for CD40.

61. The engineered ligand of claim 60 further comprising at least 30 contiguous amino acid residues of a CD154 molecule.

62. The engineered ligand of claim 61 wherein said CD154 molecule is human CD154.

63. The engineered ligand of claim 60 further comprising the idiotypic portion of an antibody which binds a CD40 molecule.

64. The engineered ligand of claim 63 wherein the CD40 molecule is human CD40.

65. The engineered ligand of claim 60 which comprises a lipid.

66. The engineered ligand of claim 65 further comprising a glycosylphosphatidylinositol moiety.

67. The engineered ligand of claim 65 wherein said lipid comprises a fatty acid.

68. The engineered ligand of claim 67 wherein said fatty acid is palmitate.

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